



McNeil Technologies

**Community Bioenergy Applications:
Providing a Market Outlet for Forest Thinnings**

**Scott Haase
April 14, 2004**



Sponsors

- OEMC
- U.S. Department of Energy
- U.S Forest Service
- Boulder County
- Jefferson County
- Aquila



Outline

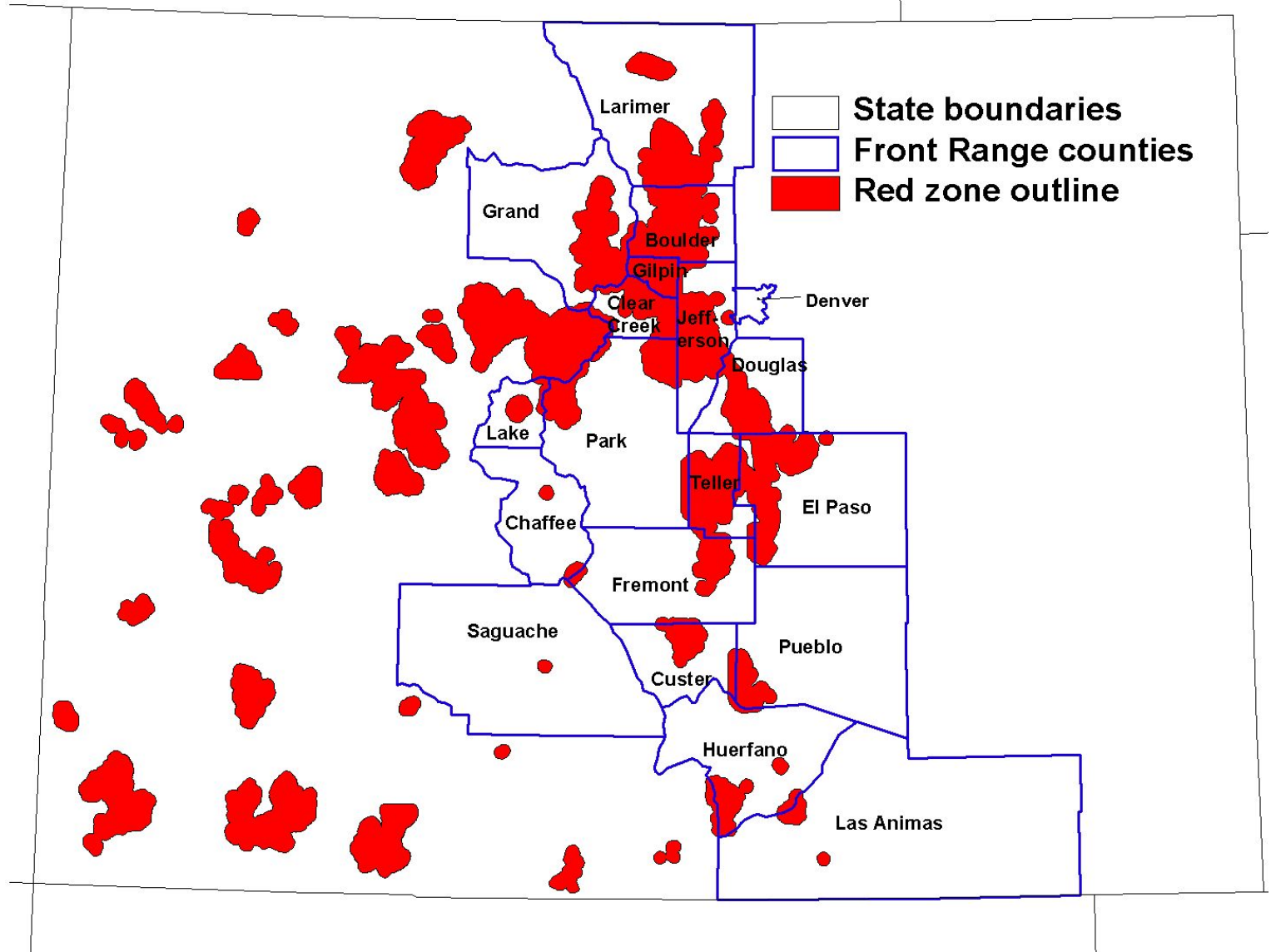
- Front Range conditions and big picture overview
- Boulder County heating project
- Aquila Green Tags project
- Jefferson County feasibility study

Colorado Biomass Information Clearinghouse

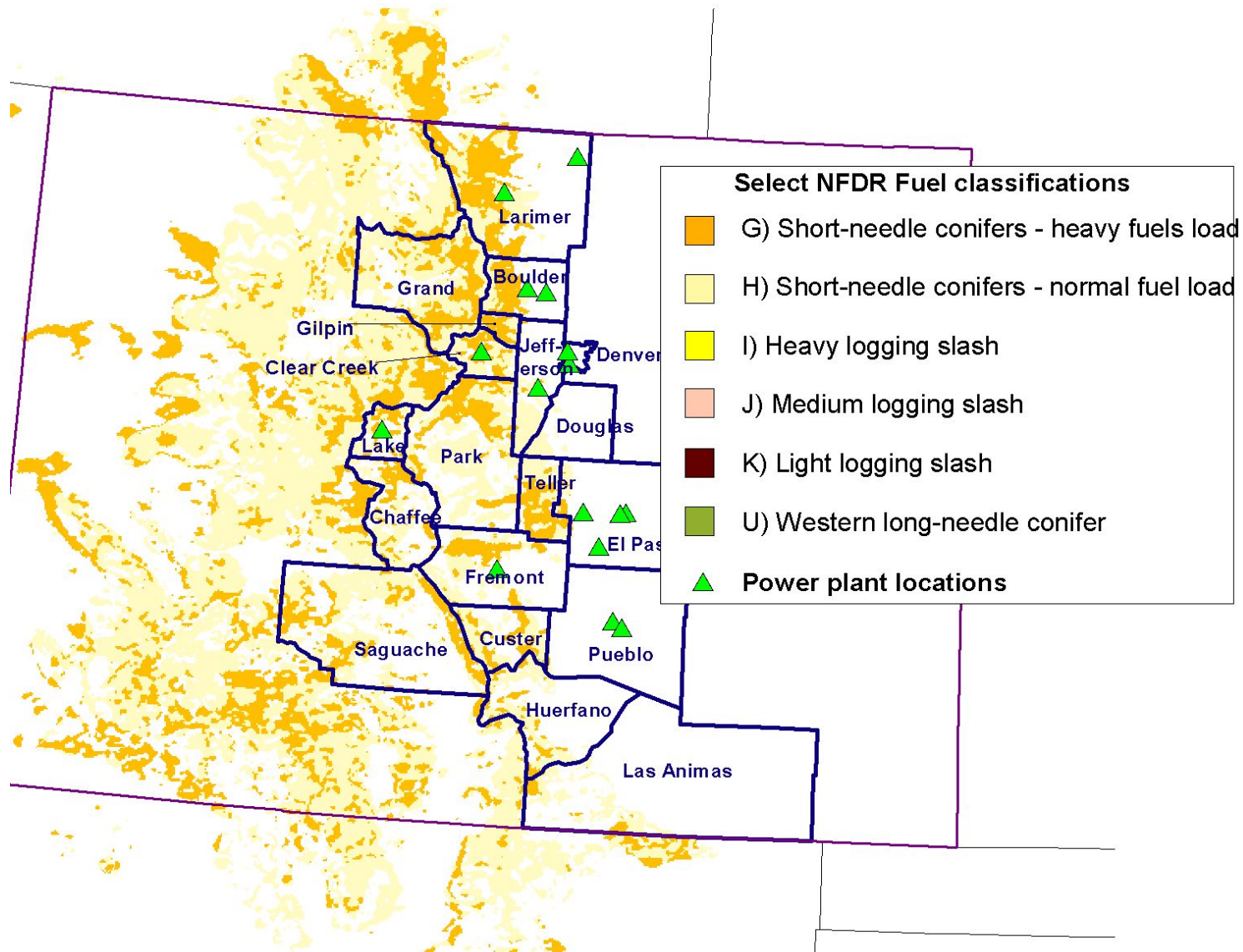


- <http://www.state.co.us/oemc/biomass/>
- Or Google – “Colorado Biomass”
- Contains reports, overview of Colorado biomass projects, company listing, links to funding sources, links to other information
- Biomass resource data being added
- Presentations being added
- Send us local project information

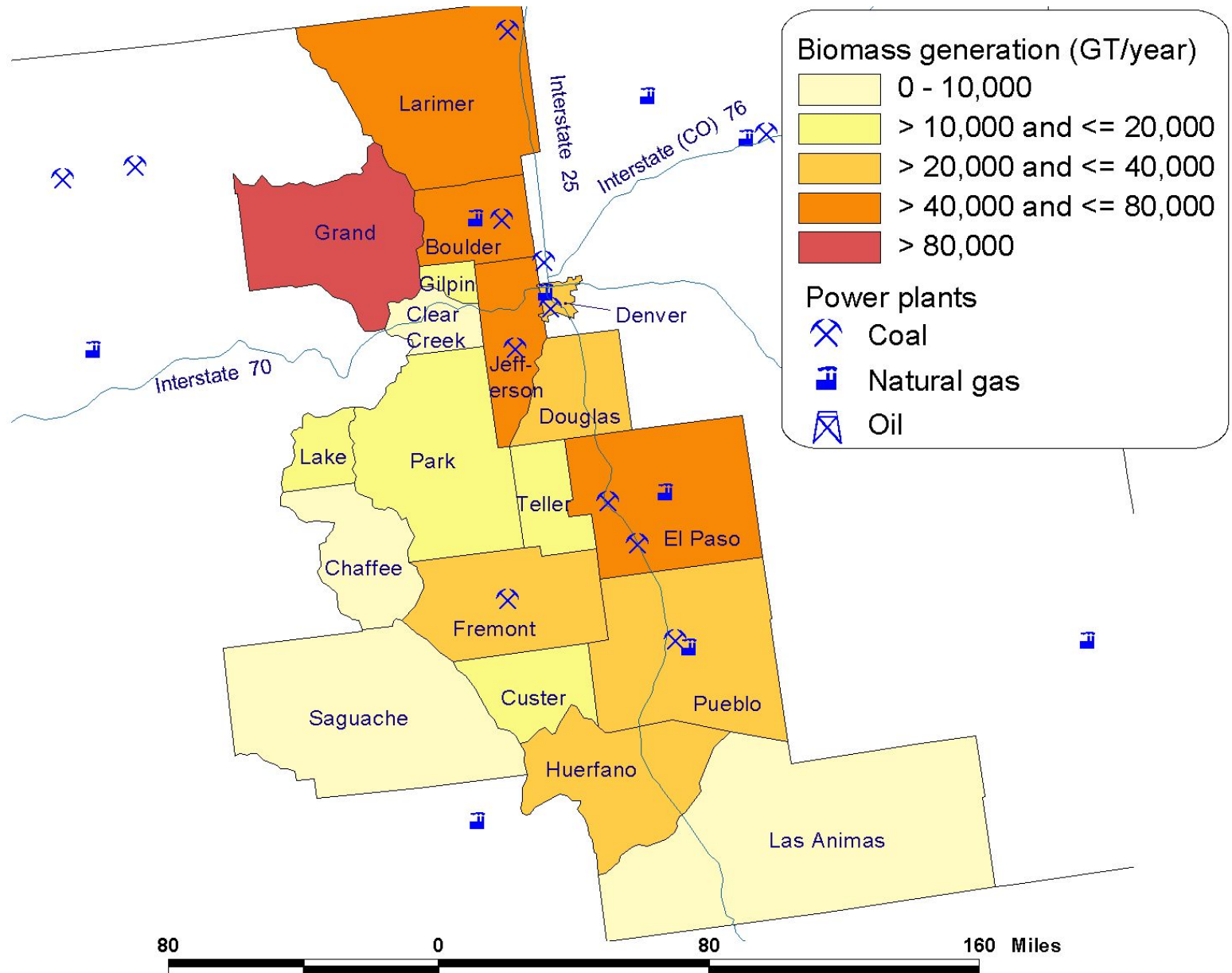
Colorado Red Zone Map



Fuel Loading Map



Wood Biomass Resource Summary



County-level Biomass Estimates

County	Land Clearing	Land-scaping	Lawn & Garden	Wood products	Comm- ercial tree care	Forest biomass	Total	Power generation capacity (MW) ^(a)
Boulder	2,147	17,183	2,470	2,852	6,009	25,023	55,684	4.4
Chaffee	1,074	669	-	730	858	1,100	4,431	0.3
Clear Creek	195	-	-	-	-	-	195	0.0
Custer	146	-	-	-	-	10,324	10,470	0.8
Denver	1,025	13,166	2,611	6,400	8,585	-	31,787	2.5
Douglas	2,489	14,282	1,552	989	3,005	16,758	39,075	3.1
El Paso	3,905	26,332	4,234	4,047	9,443	31,901	79,861	6.2
Fremont	1,318	1,116	212	303	858	23,903	27,710	2.2
Gilpin	49	-	-	-	-	19,608	19,657	1.5
Grand	1,415	1,562	-	872	429	90,274	94,552	7.4
Huerfano	195	223	-	71	429	35,830	36,749	2.9
Jefferson	3,758	20,753	2,893	2,070	15,452	21,926	66,853	5.2
Lake	293	-	-	160	-	9,663	10,116	0.8
Larimer	4,100	21,200	3,599	3,602	9,014	24,131	65,645	5.1
Las Animas	439	669	71	160	1,288	3,095	5,722	0.4
Park	1,123	223	-	472	-	15,523	17,341	1.4
Pueblo	1,708	8,703	1,058	1,703	5,580	9,729	28,481	2.2
Saguache	49	-	-	71	-	828	948	0.1
Teller	439	893	-	561	429	9,764	12,086	0.9
Total	25,867	126,975	18,698	25,065	61,380	349,379	607,364	47.6
Percent of total	4%	21%	3%	4%	10%	58%	100%	100%



Emissions from Biomass Combustion vs. Prescribed Fire

- Prescribed burning – 60 lbs PM_{10} per ton of fuel burned (Source: CDPHE)
- In 2001, 28,000 acres prescribe burned in CO, or ~ 4,200 tons PM_{10}
- Combustion biomass plant
 - Burning same amount of fuel from 28,000 acres prescribed burn would yield ~ 50 tons PM_{10}



Facility Heating

- In Vermont, dozens of schools, offices heated with automated wood systems
- Visited 11 facilities in November 2002
- Positive operator experience
 - Low maintenance, truly automated, clean
 - Sized below emission permit levels
 - Use clean, sized hardwood chips
 - Wood brokers deliver
 - No smoke plumes visible

Court House Middlebury, VT



Town of Barre – 50 Unit Low Cost Housing Complex

(Photo: Ron Diederichsen, BCPOS)



Boulder County Parks and Open Space Forestry Operations

(next several slides courtesy Therese Glowacki, BCPOS)



- Manage ~ 18,000 acres of forested land
- 9,000 acres need treatment
- Forest thinning for >20 years
- Last 5 years thinned ~50-140 acres/year
- 2002 burned 1600 slash piles
- 2002 generated 25 cords of firewood

BCPOS Forest Management







Chipping on Site





Boulder County Facility Heating Study

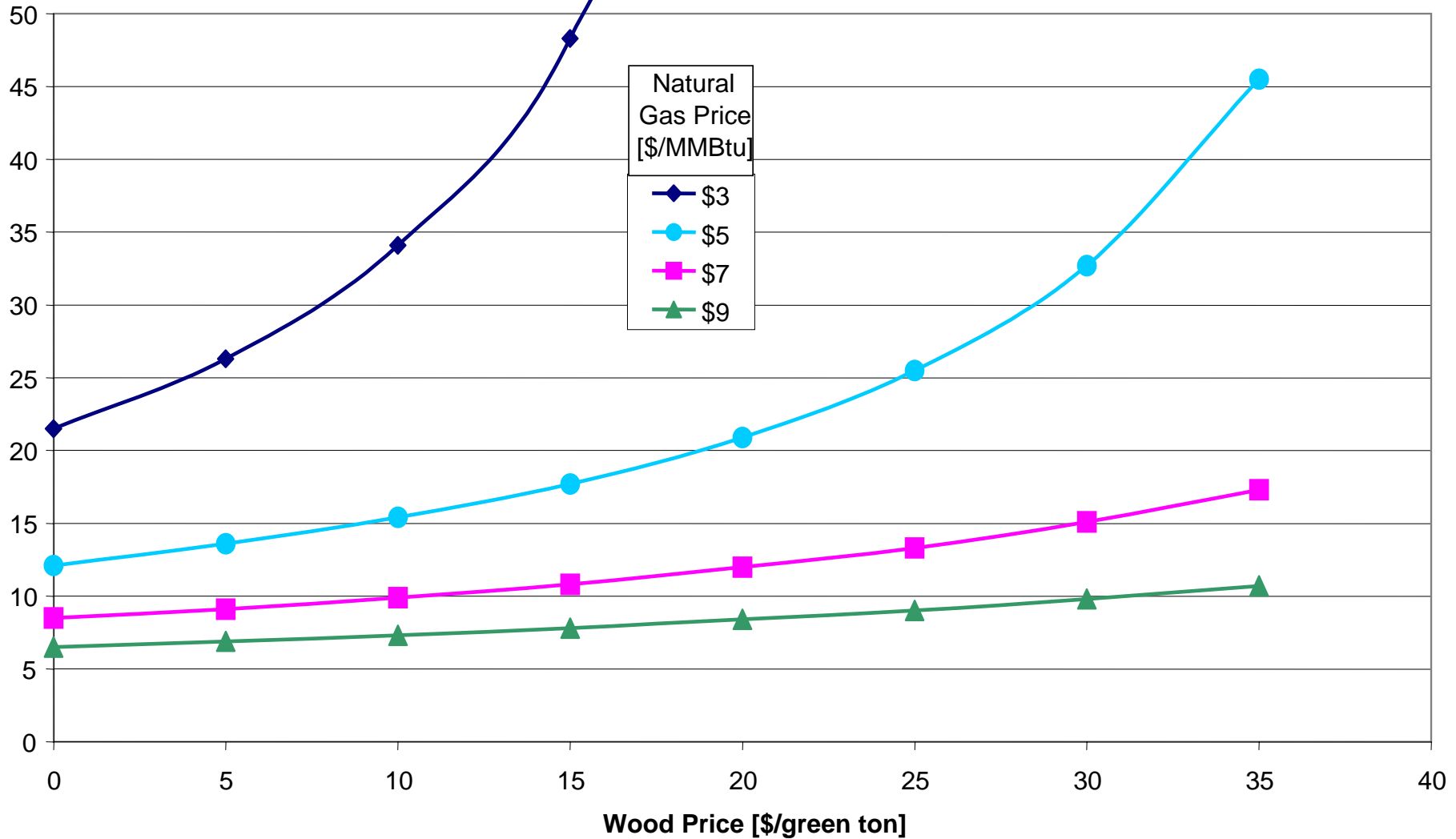


- McNeil conducted feasibility study early 2003
- Commissioners approved July 2003
 - Sierra Club reps spoke out in favor of project at the public meeting
- Use wood chips from thinning to heat new office building complex – district heating
- Use ~ 650 tons of wood per year (~65 acres)
- Incremental cost \$356,000 over NG system
- Payback 10-20 years depending on price of wood and NG
 - They assume \$5/ton for wood; \$6.20/MMBtu gas

Boulder County

Simple Payback Period vs. Wood and Natural Gas Prices

Simple Payback
Period = Initial Cost
/ 1st Year Savings



Co-firing Wood and Coal in Colorado



- Aquila - Cañon City plant
 - 2 tons/day test
 - No technical problems



- Possible utility benefits
 - Near-term, low-risk, low-cost dispatchable renewable energy option
 - Reduces SO_x and fossil CO_2
 - Fuel supply diversity
 - Good corporate citizen
- Barriers
 - Permit modifications may be needed (not at this plant)
 - Upfront costs
 - Power purchase contract requirements



Project Barriers

- Biomass costs are 2-3 times coal
- Separate fuel handling system needed for long term application
- Center for Resource Solutions: presently, forest biomass is not an eligible resource to be certified as a source for Renewable Energy Certificates
 - CRS will defer to local environmental groups if there is local agreement on a project



Front Range Survey

- Telephone survey – 100 respondents in red zone communities
- 62% said they would pay more for electricity produced from forest biomass
- 55% said they would pay \$10/month or more premium
- Preliminary data only



Aquila “Green Tag” Study

- Project will start April 2004
 - DOE/Aquila funding, OEMC support
- Goal is to co-fire 1-5 tons/day of forest thinnings with coal at utility plant
 - Plant is permitted already to burn wood
- Locate reliable source of biomass
- Determine incremental costs of electricity from biomass
- Meet with local environmental groups and obtain their support of the project



Aquila (continued)

- Certify the biomass portion of the electricity as a Renewable Energy Certificate from CRS
- Aquila would then market forest biomass green tags to:
 - red zone customers
 - government agencies
 - companies
- Work with Colorado Energy Science Center and MBA students to develop the business model and marketing plans



Jefferson
County

- Project will start April 2004
 - Partnership (federal, state, local)
- Define social, economic, regulatory problems
- Evaluate collaborative processes from other states
 - Lessons learned
- Biomass supply evaluation
 - Detailed, multi agency analysis
 - Develop GIS model
 - Evaluate transportation costs and methods



Jefferson
County

- Technology analysis, siting study, levelized costs, emissions, applications...
 - Dedicated central facility
 - Semi-mobile plant
 - Coproduction
- Identify best opportunities for bioenergy utilization in Jeff Co
- Recommendations, site, cost, ROI, financing options, next steps, timing



Status of Arizona Systems

- APS commissioned 3 MW plant in Eagar a few weeks ago
- APS constructing 5 MW (gross) 3 MW (net – due to MC) in Flagstaff
 - Chiptec gasifier
 - \$5.5 million capital costs
 - APS investigating dryer
- Both APS plants will use forest thinnings as the fuel
- APS recovering capital cost through SBC and then rate-basing premium to meet RPS targets
- Another utility in the region is developing an RFP for 5 MW biomass plant from forest thinnings



Biomass to Energy Barriers

- High cost of biomass from forests
 - Transportation: 50 percent moisture, low density, low energy
- Mistrust between environmental community, industry and USFS
- Technology misconceptions
- Utility issues (interconnection, stand-by rates, low buy-back rates)
- Assigning all of the costs of thinning to fuel supply overlooks other beneficiaries



Fuel Supply Concerns

- Need to reduce the cost
- Cost shifting mechanism
 - Biomass plant can not pay for the full costs of thinning
 - What reasonable amount could be paid to still make the project economic?
 - Can the partnerships and institutional mechanisms be developed to reliably locate the fuel supply



Summary

- New partnerships needed to develop outlets for forest biomass
 - Community-focused collaboration
- Rural economic development
- Increase competitiveness of local industry
- Green pricing could be used to offset costs of forest treatment



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